

**REMARKS/DISCUSSION OF ISSUES**

Claims 1-78 are pending in the application. Claims 1, 19, 35, 55 and 75-78 are independent claims. Because no claims were amended in the present Response, Applicants are not required to provide a listing under Rule 121.

Applicant(s) thank(s) the Examiner for indicating that the Replacement Sheet of Drawings was acceptable.

**Objections and Amendments to the Drawings**

Applicants have considered the objections to Figs. 1, 4 and 6-8 and respectfully traverse the objections. The Office Action alleges that these Figs. lack descriptive terms in the 'boxes.' Applicants have reviewed the drawings and find all drawings including descriptive terms. For example, in Fig. 1, the reference character 20 points to a box labeled 'Electronics.' Applicants respectfully submit that the objections are baseless and should be withdrawn.

**Rejections Under 35 U.S.C. § 103**

1. Claims 1, 2, 8, 9, 11-13, 15, 19, 25-27, 29, 30, 32, 75-76 and 78 were rejected under 35 U.S.C. § 103(a) as being unpatentable in view of *Ossman* (U.S. Patent Publication 20060119223) in view of *Sumanaweera, et al.* (Again, Applicants surmise that and base their

remarks on U.S. Patent 6,359,367, not 6,625,367 as stated in the Office Action, is being applied.). For at least the reasons set forth below, it is respectfully submitted that this rejection is improper and should be withdrawn.

2. Claims 3-5, 14, 16-18, 20, 21, 31, 33-39, 42, 43, 45-60, 63, 64, 66-74 and 77 were rejected under 35 U.S.C. § 103(a) as being unpatentable in view of *Ossman* in view of *Sumanaweera, et al.* and *Savord* (U.S. Patent 6,380,766). For at least the reasons set forth below, it is respectfully submitted that this rejection is improper and should be withdrawn.

3. Claims 6, 7, 10, 22-24 and 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable in view of *Ossman* in view of *Sumanaweera, et al.* and *Mequio* (U.S. Patent 4,771,205). For at least the reasons set forth below, it is respectfully submitted that this rejection is improper and should be withdrawn.

4. Claims 40, 41, 44, 61, 62 and 65 were rejected under 35 U.S.C. § 103(a) as being unpatentable in view of *Ossman* in view of *Sumanaweera, et al.*, *Savord* and *Mequio*. For at least the reasons set forth below, it is respectfully submitted that this rejection is improper and should be withdrawn.

Applicants rely on the basis in law provided in the response under Rule 111. The Examiner maintains the rejection in substantially the same form and reasoning.

**a. Ossmann fails to disclose transmitting ultrasonic energy in tissue at a fundamental frequency**

Claim 1 is drawn to an apparatus and features:

*“... transmitting ultrasonic energy in tissue at a fundamental frequency and of sufficient power to generate a harmonic of the fundamental frequency in the tissue.”*

Each of independent claims 19, 35, 55 and 75-78 includes a similar feature.

The Office Action states: “Ossman discloses an apparatus (Fig. 4) comprising: a two-dimensional array transducer (item 402) transmitting ultrasonic energy in tissue at a fundamental frequency.” The Office Action then concedes that the reference fails to disclose that the “...transmitted ultrasonic frequency is transmitted with sufficient power to generate a harmonic of the fundamental frequency” and turns to secondary references in an attempt to cure this deficiency.

At the outset, Applicants again note that claim 1 differs from its characterization in the Office Action. Particularly, the second quoted portion of the Office Action differs from that which is claimed.

Furthermore, Applicants respectfully submit that the Office Action fails to comply with MPEP § 706. To wit, this section of the MPEP states, *inter alia*:

“The goal of examination is to clearly articulate any rejection early in the prosecution process so that the applicant has the opportunity to provide evidence of patentability and otherwise reply completely at the earliest opportunity.”

In applying *Ossmann* in the rejection of claim 1, the Office Action cites a drawing figure (Fig. 4) and one reference character (402). There is no clear recitation of paragraphs or other reference characters of the reference that are the basis of the rejection. Within the over twelve paragraphs (approximately three columns) of *Ossmann* that relate to Fig. 4, the Examiner does not specifically cite where *Ossmann* discloses *transmitting ultrasonic energy in tissue at a fundamental frequency*. Accordingly, Applicants are left to speculate how the applied reference may be germane to the rejection of claim 1. Clearly, this is improper and deprives Applicants from providing a complete response in support of patentability. Thus, Applicants respectfully request that the present Office Action be withdrawn. Moreover, if another Office Action is provided to Applicants rejecting one or more of the claims, Applicants submit that any subsequent Office Action cannot properly be made final.

The above notwithstanding, Applicants submit that the reference to *Ossmann* does not disclose *transmitting ultrasonic energy in tissue at a fundamental frequency*. *Ossmann* relates to acoustic imaging systems and includes, *inter alia*, a protective cover configured to mate with a transducer body. A word search of the reference does not reveal the disclosure of a fundamental frequency or fundamental mode of ultrasonic energy. Reference is made in paragraph [0050] to an imaging system 204 with a beamformer 304 that sets the transmit frequency,  $f_0$ , and magnitude of various transmit signals. However, there is no teaching or suggestion that the transmit frequency is a fundamental frequency as is specifically claimed.

**b. There is no basis for the assertion that  $f_0$  is a fundamental frequency**

In the Response to Arguments, the Examiner alleges that the transmitted frequency is  $f_0$ , which is the notation for a fundamental frequency. While Applicants are aware that in certain contexts the fundamental eigenmode may be denoted with a zero subscript, there is absolutely no basis provided by the teachings of *Ossmann* that the transmit frequency is a fundamental frequency. Just as likely (if not more likely given the fact that the transmit frequency in *Ossmann* is described in connection with a transmit beamformer), the

nomenclature fo may refer to the **output frequency**. Regardless, Applicants respectfully submit that inferences and conclusions based on possibilities and even probabilities cannot be used in the determination of patentability. So, Applicants maintain that because the reference to *Ossmann* fails to disclose the *transmitting ultrasonic energy in tissue at a fundamental frequency* as alleged in the Office Action, a proper *prima facie* case of obviousness has not been established.

**c. Sumanaweera, et al. fails to disclose transmitting ultrasonic energy in tissue at a fundamental frequency and of sufficient power to generate a harmonic of the fundamental frequency in the tissue**

The Office Action turns to *Sumanaweera, et al.* in an attempt to cure the deficiencies of *Ossmann*. In particular, the Office Action asserts that *Sumanaweera, et al.* discloses:

*Sumanaweera et al. teaches an ultrasonic transducer array in which the transmitted frequency is the fundamental frequency, which excites a harmonic frequency of the fundamental frequency in the tissue (column 8, line 6 through column 9, line 5).*

Again, Applicants note that claim 1 differs from the characterization set forth in the Office Action.

*Sumanaweera, et al.* discloses firing ultrasonic scan lines into the subject, whereby some of the acoustic energy is reflected back to the transducer array 10. In addition to receiving signals at the fundamental frequency, the non-linear characteristics of the tissue or optional contrast agents also produce responses at harmonic frequencies. The reference discloses that these harmonic frequencies are associated with non-linear propagation or scattering of transmit signals. (Kindly refer to column 8, line 64- column 9, line 6 of the reference to *Sumanaweera, et al.*)

However, as relied upon in the Office Action, *Sumanaweera, et al.* fails to disclose at least the *transmitting ultrasonic energy in tissue of sufficient power to generate a harmonic of the fundamental frequency in the tissue*.

For at least the reasons set forth above, Applicants respectfully submit that the references to *Ossmann* and *Sumanaweera, et al.* alone or in combination fail to disclose at

least one feature of claim 1. As such, a proper *prima facie* case of obviousness based on *Ossmann* and *Sumanaweera, et al.* has not been made and claim 1 and the claims that depend therefrom are allowable.

As noted, claims 19, 35, 55 and 75-78 each include a feature similar to the feature of claim 1 discussed above. The rejections of the claims apply *Ossmann* and *Sumanaweera, et al.* in substantially the same manner as these references were applied to claim 1. Therefore, and for substantially the same reasons Applicants maintain that the applied art fails to disclose at least one feature of each of independent claims 19, 35, 55 and 75-78. As such, a proper *prima facie* case of obviousness based on *Ossmann* and *Sumanaweera, et al.* has not been made and claims 19, 35, 55 and 75-78 and the claims that depend therefrom are allowable.

### **CONCLUSION**

In view of the foregoing explanations, Applicant(s) respectfully request(s) that the Examiner reconsider and reexamine the present application, allow claims 1-78 and pass the application to issue. In the event that there are any outstanding matters remaining in the present application, the Examiner is invited to contact William S. Francos (Reg. No. 38,456) at (610) 375.8380 to discuss these matters.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment (except for the issue fee) to Deposit Account No. 50-0238 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17, particularly extension of time fees.

Respectfully submitted,

VOLENTINE & WHITT, P.L.L.C.

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By:   
William S. Francos  
Registration No. 38,456

VOLENTINE & WHITT, P.L.L.C.  
One Freedom Square  
11951 Freedom Drive, Suite 1260  
Reston, Virginia 20190  
Telephone No.: 610.375.3513  
Facsimile No.: 610.375.8380